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**NASA Aviation Safety
Reporting System:
Quarterly Report No. 11**

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Reporting System:
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**Ames Research Center
Moffett Field, Calif. 94035**

and

**Aviation Safety Reporting System Office
Battelle's Columbus Division
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NASA AVIATION SAFETY REPORTING SYSTEM: QUARTERLY REPORT

NO. 11

Ames Research Center

and

Aviation Safety Reporting Office*

SUMMARY

This eleventh quarterly report of ASRS operations contains a comprehensive study of near midair collisions in terminal airspace, derived from the ASRS database. This study was scheduled originally for publication in an earlier quarterly report; because of its significance to the aviation community, its publication was deferred to allow time for review and comment by various segments of the community. This report also includes a selection of controller and pilot reports on airport perimeter security, unauthorized takeoffs and landings, and on winter operations. A sampling of typical Alert Bulletins and their responses appears as the final section of the report.

INTRODUCTION

This is the eleventh in a series of reports based on operations of the NASA Aviation Safety Reporting System (ASRS) (refs. 1-10) under a Memorandum of Agreement between the National Aeronautics and Space Administration and the Federal Aviation Administration.

The first section presents aviation safety reports related to three problem areas – airport perimeter security, unauthorized takeoffs and landings, and winter operations. A study of near midair collisions in terminal airspace, utilizing data from pertinent ASRS reports, is contained in the second section. The final section provides a selection of ASRS Alert Bulletins and the responses to them.

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AVIATION SAFETY REPORTS

ASRS Quarterly Reports usually include a section composed of sample report narratives submitted by members of the aviation community. This edition carries a series devoted to airport perimeter security, unauthorized takeoffs and landings, and winter operations.

Airport Perimeter Security

Reports under this broad heading fall into a number of categories, but all feature the trespass onto airport operating areas of people, animals, or vehicles not properly belonging there. The first two reports that follow come from different controllers at different times, but from the same Mid-west airport.

1. Aircraft had to go around from a position over the landing threshold at a low altitude because of two bicycle riders who crossed the runway in front of him. This is a frequent and extremely dangerous occurrence at this airport. . .

* * *

2. Two people were playing with a football near the approach end of runway 25. When we notified the city ops and they approached the people, the people ran across the road and got away. A person on a motorcycle approached the runway very fast. About 30 yards short of the runway he made a right turn and paralleled the runway. He then went to the approach end of the runway and reversed course. Again, city ops was called and chased the people off the airport.

* * *

People, with or without vehicles, are a constant threat to safety, particularly at privately owned airports where funds and personnel are often insufficient to maintain fences and gates. Animal intrusions onto runways are an even greater threat; signs do not deter them and they find their way through, under, or over barriers. In some cases they show no fear of landing or departing aircraft.

3. Aircraft was cleared for takeoff on runway 24. As the aircraft took the runway, two dogs were observed crossing the runway approximately 3,500 ft down from the approach end. At this time an advisory was given to the pilot who, a moment or two later, said he had the dogs in sight. The pilot then apparently hesitated on the runway for about 10 seconds before applying power and starting departure roll. As the aircraft started to roll, the dogs were about 75 to 100 ft off to the side of the runway. It appeared that as soon as the dogs heard the increased noise they turned and ran towards the sound of the jet Two months ago a pilot was given an advisory about dogs near the runway and, stating that he had them in sight, elected to depart. This time the dogs made it to the runway ahead of the aircraft, and the pilot was forced to make an abrupt and early rotation, passing just a few feet above the dogs. The pilot was a local corporate pilot who had the

skill and experience to handle the problem without incident. However, I was not the only one in the tower to gasp -- it was close.

* * *

4. On takeoff runway 28R at 95-100 mph I was forced to make an abrupt pull-up to avoid deer (about six) crossing from left to right. I hit one deer with left main gear tire. No damage to aircraft. Damage to deer unknown. Several times during the past 3 weeks I've been warned of the presence of deer by ATC. In this case deer had not previously been reported. Had I been going slower or on landing roll, there could have been an accident. About 2 weeks ago a deer was killed on the runway by aircraft. With the deer present, night flight operations become a definite hazard.

* * *

Pedestrians appear with frequency in perimeter security reports, as do children -- sometimes mischievous, sometimes innocent.

5. The field is bordered by a park to the west. There are many openings, holes in the fence where juveniles come through, walk up to and onto airport surfaces. In this instance, one boy, part of a group, walked onto the surface and waved his arms as a dare, to landing and departing aircraft. There was a period of about 3 minutes when we had to close the runway. The kids, chased away by airport personnel, return as soon as they leave.

* * *

6. Aircraft (call sign unknown) reported two pedestrians approaching runway. City operations advised of above; will respond. Two pedestrians crossed runway 25 ft in front of aircraft midway down the runway on final approach to a long landing. At that time aircraft was issued a go around. Aircraft passed the pedestrians (off his left wing) just as he cleared the runway. It was very close.

* * *

Motor vehicles on various missions account for the largest number of airport trespasses. The first report below cannot be classed strictly as a violation of perimeter security but illustrates a hazard to normal airport use. Those that follow are typical of the many received by ASRS.

7. A bus-driver training school is being conducted on XXX Airport without FSS being told. I discovered this as I turned final and saw that several buses had driven onto the airstrip. I was in communication with XXX Radio, a YYY remote and had just given them a PIREP. I had overflown the airstrip to see the sock and gave the PIREP on my downwind leg. Because of the canyon and wind conditions, I did not see the airstrip during base leg. The buses drove onto the runway after I left downwind and after I had talked with XXX. Evasive pilot action was required. The buses remained on the field during the landing and were unaware that their presence comprised a hazard to landing aircraft. The drivers of the buses were trainees who were trying to pass a driving skills test.

The airport is posted with a sign warning them to keep off the runway proper. Traffic cones were set on the runway restricting one third of its width at midfield. These were not seen from the flyby and not seen until roll out.

* * *

8. Aircraft A completed a local flight. Its pilot and one passenger decided to take off for a second practice night landing. No traffic of any kind was visible to the pilot as he began his takeoff roll. After about 400 ft of T/O roll, at an estimated 45 knots, he observed an automobile proceeding from behind T-hangars (to the left of the runway) onto the runway. The automobile proceeded diagonally across the runway, applied its brakes, and stopped on the runway. Aircraft A was unable to divert to the left because of the proximity of the hangars, unable to divert to the right because that was the apparent path of the automobile, and unable to stop because of the proximity of the automobile. The pilot continued the takeoff run, moved to the left edge of the runway, and commenced a sharp left turn at liftoff. A witness on the airport grounds described the event as follows: "I saw the aircraft and auto collide, but heard no noise. It wasn't until a second later that I realized the pilot had avoided the collision." This field is one of many general aviation airports where there is easy access to the tie-down areas by automobile. As a pilot, I find this convenient. As a pilot, I look both ways before crossing a runway. The driver of the auto was not herself a pilot, but is the wife of a pilot. She was crossing the runway to meet her husband at his aircraft. She was not thinking of caution at the time.

* * *

Many airports are surrounded by land devoted to agricultural activity; it is obvious that such activity will generate considerable vehicular comings and goings. The ubiquitous pickup truck appears in this final narrative of the set.

9. November Lima One Five, an F106 military fighter aircraft, was forced to go around due to a no-radio farm pickup truck which crossed the landing runway directly in front of the aircraft. I was working the ground control position and was aware of a haying operation on the northwest side of runway 21 at the departure end. It was decided to combine the local and ground control positions and I relieved the local, while keeping the ground position. I was briefed on the position and the only traffic was NL15 on short final, already cleared to land. NL15 stated he was going around and requested closed traffic. At this time I noticed NL15 gear up on the go and a pickup truck which appeared to be stopped about 5,000 ft ahead of him. The truck then sped off the runway. Apparently the truck came off the highway, across the runway 21 parallel taxiway, then crossed the active runway. I had looked at the vicinity where the truck crossed no more than 30 seconds prior to the incident and I observed no vehicles. Previous local controller stated he also checked the runway prior to issuing landing clearance to NL15, and he also observed no vehicles. I believe the pilot made a timely and accurate decision with regard to the go-around and saved an imminent situation. It is my understanding that farm crews are allowed on the airport to cut and remove the hay. They have no radios but are forbidden to cross any runways without radio contact.

Unauthorized Takeoffs and Landings

Good practice and regulations alike mandate that pilots obtain a clearance from ATC before commencing a takeoff or executing a landing at a controlled airport. For a number of reasons, most notably distraction or misunderstanding, aircraft nevertheless continue to come and go without appropriate authorization. Culpability for many of these unsanctioned operations can be assigned to use of less-than-clear phraseology. Adherence to the policy of clearance acknowledgment or read-back would eliminate a proportion of these potentially hazardous incidents. Mind set – the preconceived message, hearing what one expects to hear – accounts for many of the incidents. Many more are caused by complacency in the form of frequency-change neglect. In the set of unauthorized takeoff reports that follow, several of these points are illustrated. The first report differs from the typical in that it describes the mistake made by a pilot of limited experience, who, happily, learned a useful lesson. The other reports follow more common patterns.

1. Ground Control instructed me to taxi to runway 17. At this point I wasn't sure if "taxi to" meant authorization to be on 17 or just be short of 17. I had anticipated a reply of "taxi to and hold short of runway 17." There were two planes just in front of me taxiing out. I thought that I would just listen to ground frequency and see what they transmitted to Ground. I followed the two other planes out to the hold-short line and waited for them to take off. At this time I had heard no transmissions by Ground since I had advised them of being ready to taxi. I decided that the airplanes in front of me had probably been given the same instructions to taxi to runway 17. Thinking this, and hearing no further ground instructions or communications between the planes in front of me, I decided that "taxi to" meant clearance to taxi onto active runway. (I realize now that the two planes in front were probably on tower frequency from the beginning). The reason I felt that I would hear further instructions between Ground and the planes in front was I thought Ground had to tell you to switch to Tower before you could. Following what I thought was correct, I taxied onto the active when the plane directly in front of me was full throttle and well on its way down the runway. I applied full throttle and at about one half the runway, Ground contacted me and asked if I was on the active. I replied, yes. He then stated I didn't have permission. I apologized. I then contacted Tower and asked for permission to make a right crosswind departure over the city. They said I could, so I departed. I realize now that the problem lay with my lack of knowledge as to proper terminology at that time. I have taken measures to correct this lack of knowledge while flying in the Air Traffic Control area.

* * *

2. Airline flight taxied on Ground Control. Received IFR clearance with void time 2 minutes away. Both of us extremely rushed to complete checklists, both under the impression takeoff clearance had been received along with IFR clearance. However, after takeoff we noted the comm receiver was still tuned to Ground, and we realized we had taken off without clearance. . . . Several factors here: (1) Biggest was adjusting to the presence of a separate ground control frequency at this airport. Both of us have flown for years around this area and have always seen ground and local functions performed on a single frequency at the outlying airports. In particular, at this airport, where clearance void times are often scant minutes away, takeoff clearances have been issued concurrently

with ATC clearances while the aircraft is still taxiing. I believe a long period of this practice had conditioned us to expect a takeoff clearance under these circumstances, and it just didn't "click" that we needed to switch frequencies and specifically ask for one. We were both convinced we had been cleared for takeoff until we saw the radios were still tuned to Ground. (2) We received zero help from ATC. . . . Although we certainly erred by misinterpreting our clearance, a call from ATC on ground control would have stopped us immediately.

* * *

3. I received a Special VFR clearance. . . . The ceiling was about 900 ft and visibility was good. The controller told me he had my SVFR and to taxi to runway 31. I taxied to runway 31 and did a run-up, then the controller said I had SVFR and was cleared out of the control zone. I took this second transmission to mean I was cleared to leave – take off – and I did. The next communication was something like this: "Turn right to 040°, and you were not cleared for takeoff." I acknowledged this, and then a few minutes later reported leaving the control zone, as requested. The problem was discovered because the controller told me. . . . I believe the factors that contributed to this occurrence were as follows: (1) I was damp and cold from the rain and low temperature; this may have distracted me. (2) The controller first told me I had SVFR when I was on the ramp. After I had done the run-up at the hold line, he once again said I had SVFR and was cleared out of the control zone. I took this as a clearance to take off. I had taxied to the runway with knowledge that I had SVFR, or I wouldn't have taxied at all. After my run-up and the second transmission from the controller about being cleared out of the control zone, my mind was ready to go -- especially when hearing the word "cleared" after my run-up.

* * *

The following narrative illustrates how a number of circumstances, individually untroublesome, can combine to cause concern. The reporting pilot analyzes the situation with clarity and offers suggestions to prevent recurrence. On this occasion, the partially-blocked transmission and flight number similarity problems, both often found in other flight situations, appear.

4. While holding short, Number 1 for takeoff, we were advised of a 3-minute delay. In about 3 minutes we were cleared for immediate takeoff. I taxied into position, noting lights of aircraft on approach which seemed fairly close, but not unreasonably so. The first officer acknowledged the takeoff clearance in detail as we started to taxi into position. I then took off. After takeoff, the tower advised that we had not been cleared for takeoff. (1) We were Number 1 for takeoff. (2) No mention was made of an intersection takeoff. (3) All aircraft holding short, Number 1 for takeoff on this runway, face approaching traffic and cannot see aircraft taxiing for intersection takeoffs. (4) The first officer carefully acknowledged the takeoff clearance in detail and was not questioned by Tower. (5) All available exterior lights on aircraft were on as we taxied into position and took off.

Results: Takeoff clearance was intended for another aircraft. (1) His call sign was similar. (2) Both aircraft simultaneously acknowledged it. (3) The other aircraft took off

ahead of us from an intersection several thousand feet down the runway – his lights hidden by a slight crown in the runway.

Suggestions: (1) Intersection takeoffs should be referred to by name. (2) Immediate takeoffs, with the haste they connote, should not be suggested by towers nor accepted by commercial carriers. (3) Any time two aircraft are in position and expecting takeoff clearance, Tower should note position of both aircraft after issuing takeoff clearance – especially if he is talking rapidly, their numbers are similar, and the acknowledgment is garbled.

* * *

In the final takeoff incident in this set, the “immediate takeoff” phrase once more appears, although with different effect.

5. Aircraft “B” was on a 2½-mile final to runway 32L, cleared to land. Aircraft “C” was cleared to land on runway 35, to hold short of runway 32L intersection. Aircraft “A” was holding short of runway 35, ready for takeoff. I was working local control position in the tower and asked “A” if he could make an immediate takeoff. He replied that he could and was subsequently cleared for immediate takeoff on runway 35. “A” sat in position on the runway for an extended period of time and was instructed to cancel his takeoff clearance and taxi off the runway. He did not respond to these instructions and departed, passing through the intersection of runway 32L. Both “B” and “C” were on short final to their respective runways and had to be issued go around instructions.

* * *

Distractions attributable to traffic watch, concern over weather, and last-minute checklist items often cause cockpit crews to neglect the frequency switch from Approach Control to Tower. Although pilots nearly always accept the responsibility for landing without clearance, they frequently – and very humanly – point to contributing factors. The first narrative in the following set deals with a double violation of procedure: two aircraft caught in the same trap.

6. Captain was flying the aircraft when we were cleared for an ILS to runway 5R. Weather conditions were 500/1 1/2 in blowing snow, with braking action reported as poor. The first officer acknowledged the approach clearance which included instructions to contact the tower at the outer marker. First officer failed to switch to tower frequency, which was not detected by captain, and subsequently the aircraft landed without a landing clearance. At the same time, another air carrier aircraft was on approach control frequency for an approach to the parallel runway, 5L. A conversation took place between that aircraft and Approach Control regarding the field condition, braking action, the possibility of having the runways treated again, etc. His preoccupation with these factors caused him also to fail to switch to tower frequency for a landing clearance. While I cannot but accept full responsibility for my failure to obtain a landing clearance, I believe there are some human factors involved that led to both aircraft landing “unannounced.”

7. Flight was IFR inbound from the north, cleared through a series of frequency changes and radar vectors until in contact with Approach. ATIS indicated radar vectors to

runway 13R traffic pattern. When within 5 miles of airport, Approach Control asked if we preferred runway 18. We responded affirmatively but requested runway length. Approach slow to answer – “Cleared to runway 18, go to Tower on 118.7, runway length 6,100 ft.” Captain didn’t hear runway length; copilot looked it up after setting 118.7 on transceiver. Copilot did not use throwover switch to get on 118.7, however. At this point flight was on a high, close final to 18 and busy completing checklist. Landed without landing clearance from Tower and still on approach control frequency. Approach Controls are now using terminology traditionally that of the tower when giving vectors for visual approaches: “You are Number two on downwind for 31; follow the aircraft in your two o’clock position; cleared to runway 18.”

* * *

8. Approach was being made to runway 4R in VFR conditions with considerable vectoring and considerable communication traffic. An approach from an approximate 90° base leg was being planned from directions given by Approach Control. Then we were asked if we could proceed directly to the airport, or words to that effect, so that we would therefore cut the corner, as the extra time to make a 90° turn was apparently not needed. Since we were close in, we hurried our final landing configuration and checklists. At this point, Approach Control said something about “Tower” and “landing.” None of the three crew members caught the exact transmission; I assumed we had landing clearance and executed the landing. . . My first officer noticed the problem when he was about to switch to Ground Control – we were still on approach control frequency. A switch to Tower was then made, and the tower asked if we would kindly switch to him more quickly. I believe allowing ourselves to become distracted because the approach was smooth, routine, and VFR, but coupled with an abundance of radio chatter that we did not key up to, contributed greatly to the landing without tower clearance.

* * *

9. We approached the airport from the northeast on a “Low Profile Descent” for runway 17; I (captain) was flying. Last assigned altitude was 11,000 ft, heading 240°, at 210 knots. We were then asked if we had the airport and traffic at twelve o’clock in sight. Replying, “Affirmative,” we were cleared for a visual approach to 17L. This required a fairly steep descent to intercept the landing profile for 17L, as the approach end is more than a mile further north than 17R. Also, this brought us almost abeam the traffic sighted going to 17R. Our concern was watching the aircraft on our right and intercepting the proper landing profile. To the best of my knowledge, we did not receive instructions to switch to tower frequency until touchdown, and shortly thereafter I noticed we were still on approach control frequency. The first officer immediately switched to tower frequency and we heard the tower call us. Upon answering, the controller asked, “Do you want clearance to land?” As we were already on the rollout, this seemed somewhat facetious. The first officer replied, “Well – yes.” The controller then said something to the effect that, “It’s not funny. This is serious business.” A few minutes later, after advising us to contact Ground Control, we were told to telephone the tower. I called the tower after arrival at the gate and apologized to the tower supervisor for missing the clearance. The supervisor said the controller heard laughing and inferred we didn’t take the situation

seriously. I assured him that no one was laughing and explained why I thought we had missed the frequency change for clearance. At no time did I see a conflict in traffic on the runway; it was clear. I feel that had we been advised earlier of our sequence for landing and which runway we would use, it would certainly have alleviated the situation.

Multiple – either parallel or intersecting – runways add an extra error-inducing element to the already complex situation. Extreme alertness is required of controllers, as well as flightcrews, during the approach-landing phase of flight.

10. I was working local No. 2 position in the tower. Aircraft “A” called ready for departure on runway 33R. After verifying my Number 1 aircraft for 33R was on right base, I cleared “A” to taxi into position and hold. Rechecking the final, I saw an unidentified aircraft “B” on a short final for runway 33R. He flew over aircraft “A” and landed in front of him, at which time he made the first left turn and cleared the runway. I subsequently learned that aircraft “B” was cleared to land on runway 33L, which is separated by 900 ft from 33R. Weather was clear, visibility 6 in haze.

* * *

The final report in this series shows that professional flightcrews and inexperienced general aviation pilots alike are subject to lapses of attention. Report No. 12 was submitted by a pilot with the highest flight time yet reported to ASRS.

11. I was in a small aircraft about to land after completing the first of three legs of the “long cross-country” requirement for the commercial pilot certificate. Approach Control turned me over to the tower, who gave me instructions to land – I was to enter left base. A short time later I landed. Upon touching down, I was told to telephone the tower. Ahead of me – at least 1,000 ft off – was what seemed to be a snowplow. At this point I realized I had landed without being cleared by the tower. I realize the mistake I made could have created a potentially dangerous situation; it is certainly something I won’t forget. I do feel I was clear of the runway well ahead of the plow (which I, of course, did not see until I was on the runway). The tower never did call me to warn of the hazard on the runway. I’m certainly not trying to shift blame, as I was not, in fact, cleared to land – obviously an oversight for which only I am to blame. The tower also told me I did not report on base – I do not recall being asked to. Perhaps in the future I will always report on base if not already cleared to land. I was keeping an eye out for other traffic and obviously didn’t check out the full length of the runway as well as I should have. I’ve certainly learned a few lessons from this. Recurrences could be prevented by (1) always reporting on base if not already cleared to land, and (2) by making sure I’m cleared for landing.

* * *

12. Approach cleared us for a visual landing if we had airport in sight. We did. As I recall, he did not say, “Go to Tower, 118.1,” and we neglected to do so. On landing we switched to Ground Control and got clearance to cross left runway and to the gate. Nothing was said as we were having problems with our landing light and Ground Control

made no mention of it. It was late night, no traffic to speak of. We were 1:10 late on a 5-hour trip. I think this is a crucial period of flight; from the time Approach Control turns you over to Tower, you only have about 2 to 4 minutes to switch, which is a little tight—and a busy part of the flight. I have noticed that sometimes you have to ask to switch over to Tower. But also it is everybody's job to do so and we fell down on our part.

Winter Operations

The onset of winter, following the often benign autumn weather, invariably brings with it challenging difficulties for flight crews and ground support staff. The majority of ASRS reports peculiarly related to winter deal with ground-associated occurrences. Leaving aside low visibilities and ceilings, and rain—features not restricted to the winter months—some reports do describe cold-weather effects on flight. The first narrative in this section illustrates one hazard encountered by a general aviation pilot flying a small aircraft. Efficient and cooperative air traffic control personnel, a pilot who kept his head, and some luck combined to avert a potentially disastrous event.

1. The engine quit shortly after switching to left fuel tank from right tank. Would not restart with fuel selector valve in any position. I so informed Approach and was given vectors to an airport about 5 or 6 miles east, across the bay. Approach was very helpful with vectors, traffic advisories, and telephoning the airport to find the active runway. A safe landing was accomplished. After landing, I found that only slow drips of fuel could be obtained by pulling strainer drain knob. I was able to start engine after a wait and taxi several hundred feet before it quit. After several starts, I taxied to the ramp area. A heat gun was used to warm the low-point drain plug, after which fuel flowed freely. It appears that a small piece of ice must have come from the left tank after I switched and was caught in the drain, blocking further fuel flow from all tanks. Temperature at cruising altitude was 17°F, and the overnight temperature was in the 20s; no traces of water or ice were seen during preflight. However, a sharp cold front had recently come through after some warm, wet weather and the inside of the cockpit had ice and frost on windshield and on the area just above the windshield. When we turned the aircraft into the sun to melt frost from the wings and windshield, this ice melted and dripped into the cockpit. I believe that there must have been a similar situation in the tanks, and that water from melting ice dripped into the fuel and then froze as droplets. The tanks were not full. This is a club aircraft and the possibility of water condensing in partially full tanks has been discussed often. The club has a rule that pilots should fill tanks after a flight, but the planes frequently do not get refueled after returning from flights if the pilot is not inclined for some reason to taxi over to the GA terminal area and look up a lineman for service.

* * *

The next narrative illustrates initiative and ingenuity on the part of the pilot of a turboprop aircraft in his effort to avoid a long ground delay. It also suggests an unintended use for those large paddle propeller blades.

2. My flight was operating through the airport with scheduled ground time of approximately 1 hour. Heavy snow had begun to fall just prior to landing on the inbound leg. My company does not have its own people at this airport, and we are handled on the

ground by another air carrier. Before departure time I called for the aircraft to be de-iced as a precaution and was told that no deicing equipment was available; also that no other carrier would be able to loan their equipment for at least 2 hours. A walk-around inspection of the aircraft showed a collection of dry powdered snow on the upper surfaces that could easily be brushed with a broom. There was no evidence of any ice.

I started the engines and repositioned the aircraft away from the gate. A subsequent inspection showed that the snow on the aircraft had been blown off and no ice existed. I departed approximately 1 hour and 20 minutes late. I make this report solely to document that even in this "modern time" of aviation, pilots are called upon to "ad lib" (in the absence of) necessary ground support equipment.

* * *

Abnormal braking response is cited frequently in winter landing incidents. In some cases, pilots are deceived by appearances; in others, by lack of information concerning conditions and are thus lulled into unwarranted confidence.

3. After being cleared by Center, we commenced the localizer approach. While the copilot was monitoring ATC, I called UNICOM, for advisory service. They told me that the visibility looked good—about 1 mile, with wind from the east-northeast about 10. No mention was made of runway conditions and I asked to have the lights turned up full bright. Descending to our MDA of 1,100 ft there was good visual contact with the ground. The runway came into view approximately 3/4 mile from the approach end. Then I noticed a snowplow on the extreme right edge of the approach end of the runway. I delayed the vertical descent rate slightly to make sure the right wing would clear the plow; this caused me to land slightly longer than normal. The runway appeared to be in perfect condition — all dry and bare. Upon landing, ground fine and braking felt normal on first application; subsequent brake applications became less and less effective until there was no effect at all. By this time I did not believe we could make a go-around; consequently we slid off the end of the runway approximately 30 ft. The odd part in my opinion is that the aircraft never appeared to slip or skid at all. It went straight ahead and appeared to accelerate rather than stop.

* * *

4. Aircraft slid off the runway onto over-run. Came to rest 15° right of centerline and approximately 150 ft (nose) from runway end. Runway 27L is 10,000 ft long. Surface was snow-packed except for an area from east end to intersection of 32L that was about 75 ft wide down the middle. ATIS info advised braking was "fair to good." Approach was completely normal at bug plus 10 knots (wind 240° at 6). Touchdown point was normal in that we did not float excessively; I would just touch down about 1,500 ft down runway. Reverse was normal, with braking applied at 80 knots and coming out of reverse, at that time. Deceleration was normal and we almost made turnoff at 32L, but for maybe 10 knots. We knew we couldn't do a 180° turn with traffic close behind, so accelerated to maybe 40 knots (not registering airspeed) to hurry to end for turnoff. Shortly after passing 32L intersection, Tower asked us to expedite to end. At this point,

I felt we were going fast enough. I also noted at this time that runway was completely snow-packed and white, that is, no sand visible. As soon as Tower made request, I tried brakes to check effect. No braking noticed (anti-skid on). We still had, I would judge, 2,500 ft remaining so waited until we got closer and slower from coasting before applying brakes again. No reverse used as I felt that we could still turn off and that reversing effectiveness would be nil anyway at this slow speed. At about 500 ft from end and at about 10 knots, and with brakes on, it became apparent we could not reduce speed further by time of turnoff at end. Some nose wheel steering was effective. Estimate 18 in. plow ridge on edge of turnoff taxiway and about 12 in. standing snow on over-run area. I was concerned about side stress on gear should I turn aircraft sideways and hit snowbank at turnoff. I elected to turn right slightly to avoid first approach light stanchion, not knowing how far I would continue after leaving runway. We later used 2 and 3 at 90% reverse and backed our way out on the same wheel tracks we had just made. Company maintenance was with us then and advised no damage to aircraft, no passenger injuries. Taxied to ramp, aircraft was serviced, and we continued our flight. This incident points up that braking reports are misleading as given. No mention was made that braking report pertained only to part of runway or that last 3,000 ft was exceedingly slippery. We had absolutely no braking from the time we were about 3,000 ft from the end until we came slowly to rest off the runway. Braking reports imply runway condition and braking effectiveness – the whole runway. If far end is nil, then it should be so reported. I think if it had been in this case, the incident would not have happened.

* * *

The final narratives in this series again emphasize the need felt by flightcrews for accurate and timely information about runway, taxiway, and ramp conditions: lack of information caused a mishap, which so distracted one reporter that he subsequently committed a navigational error.

5. Landed 32L. Tower requested expedite clearing runway. Turned on taxiway T2 and discovered it was not plowed; we were not advised of same. We had used T2 a couple days before and it was clear then. Tried to make a 180° turn, but after 90° of turn, nose started to slide and we stopped while still on taxiway. ATIS and NOTAMs never mentioned what taxiways were open or closed. The only damage was nose taxi-light burned out.

* * *

6. Conditions on the runway were indicated as 1/4 to 1/2 in. of slush; 50-75% coverage. When we touched down the slush started flying all over the place. Our windshield was completely covered and obscured our vision forward. Then one of the engines on our aircraft quit because of water ingestion. We were unable to taxi on one in all that slush and it took several minutes to accomplish a restart to get off the runway. An aircraft on approach behind us had to make a missed approach/go-around. If we had known the actual condition of the runway (2 to 3 in. of slush, 100% coverage) we never would have attempted the landing. I believe this hazard could have been eliminated if the airport authority . . . would recognize some of these hazardous conditions when they make their runway checks (several had been made). This problem could have been alleviated in any one of three ways: (1) accurate condition report, (2) begin snow removal, or (3) close the runway due to unsafe condition at the time.

A STUDY OF NEAR MIDAIR COLLISIONS IN U.S. TERMINAL AIRSPACE

Charles Billings, Ralph Grayson, William Hecht, and Renwick Curry

Background

Since April 1976, when the NASA Aviation Safety Reporting System was implemented, potential or actual conflicts among aircraft have been a leading topic in reports submitted by both pilots and air traffic controllers. This report examines a subset of conflict reports: those concerned with near midair collisions in terminal airspace within the continental United States.

Objective

The objective of this study was to characterize ASRS reports of near midair collisions in terms of their distribution and operational significance, with emphasis on the human factors in such occurrences.

Definitions

1. *Near midair collision (NMAC)*: A near midair collision is defined for the purposes of this study as a conflict between two aircraft in which the reporter's estimate of miss distance is less than 500 ft, or evasive action is taken to avoid a collision, or it is reported that there was insufficient time to take evasive action.

2. *Terminal airspace*: A near midair collision was described as occurring in terminal airspace if it occurred within 30 miles of an airport from which an involved aircraft had departed or at which it intended to land.

3. *Terminal control area (TCA)*: A near midair collision was characterized as occurring within a terminal control area if its position at the time of the encounter was within the geographic confines of a TCA, as defined in appropriate Federal Aviation Regulations.

4. *Terminal radar service area (TRSA)*: A near midair collision was characterized as occurring within a TRSA if its position at the time of the occurrence was within the geographic confines of a TRSA, as described in appropriate publications.

5. *Other terminal airspace (OTA)*: All near midair collisions that occurred in terminal airspace but not within a TCA or TRSA were characterized as occurring in other terminal airspace.

Approach

The data in this study were drawn from a total of 2,512 reports received by ASRS during the period May through part of November, 1978 (6½ months). Computer-aided retrieval techniques

were used to select approximately 1,000 reports, each of which was then analyzed to determine the answers to the following questions:

1. Was the occurrence described in the report a near midair collision as defined above?
2. If so, was the report unique, or was the occurrence also described in other reports?
3. If the report described a valid and unique near midair collision, in what type of airspace did it occur?

Two research analysts independently examined all questionable reports; the reports were included in this study only if both analysts agreed that the described occurrence met the study criteria.

Results

After the near midair collision reports were identified and duplicate reports were excluded, they were categorized by the airspace in which they occurred. Table 1 summarizes the results and contains an estimate of reported NMAC per year in each category of airspace and average number of NMAC in a terminal area of each category. It was assumed that there were 21 TCA's during the period of the study, 82 TRSA's during the period, and 407 other terminal areas serving controlled airports. The count of 407 "other terminal areas" (OTA's) includes terminal airspace, as defined above, surrounding TCA's and TRSA's. Near midair collisions occurring in terminal airspace surrounding a TCA or TRSA, but not within the stage III airspace, were categorized as occurring in OTA.

TABLE 1.— REPORTED NEAR MIDAIR COLLISIONS IN TERMINAL AIRSPACE
[Based on May-November, 1978, intake.]

Airspace category	Number of terminal areas	Reported near midair collisions	Estimate of reported NMAC per year	Reported NMAC per year per terminal area
TCA	21	76	140	7
TRSA	82	120	222	3
OTA	407	231	426	1

Table 2 relates the estimates of reported near midair collisions to yearly controlled airport traffic volume (refs. 1, 2) in the three categories of terminal areas. It estimates the likelihood that an aircraft will be involved in a reported near midair collision during a single operation into or out of a terminal area of the stated type.

TABLE 2.— REPORTED NEAR MIDAIR COLLISIONS RELATED TO TRAFFIC VOLUME

Airspace category	Estimate of reported NMAC per year	Controlled airport traffic volume, millions	Frequency of reported NMAC per million operations
TCA	140	7.8	18
TRSA	222	16.2	14
OTA	426	52.4	8

The data in table 2 can be read as follows by using the reciprocals of the numbers in the last column:

1. In TCA's, one NMAC was reported to ASRS for each 56,000 operations (takeoffs or landings at airports within the TCA).
2. In TRSA's, one NMAC was reported to ASRS for each 72,000 operations.
3. In OTA's, one NMAC was reported to ASRS for each 125,000 operations.

In interpreting these statistics, it is critical to note that they represent an estimate of the risk of an undesired outcome (a near midair collision) during a single exposure of an individual aircraft to an environment in which that outcome is possible (an operation into or out of a controlled airport in a terminal area). This description of risk has been chosen as most appropriate to the purposes of this study, but other measures of risk are possible and have been used by others (refs 3, 4).

The description of the risk in these terms, or in any other, says nothing about the factors that may contribute to, or ameliorate, the magnitude of that risk. In this case, many factors modify the risk of a near midair collision in terminal airspace. Traffic density is an obvious and important factor, but airspace configuration, air traffic control strategy and tactics, aircraft speed mix, airport locations, and terrain constraints are others that must be considered in evaluating the risk. Graham (ref. 5) has shown both a general increase in NMAC as a function of potential conflict pairs of aircraft (PCP), a factor related to the square of the number of aircraft using a terminal area, and relative decreases in NMAC rates associated with the provision of stage III procedures in TRSA's and with airspace segregation and stage III procedures in TCA's.

The ASRS data indicate that near midair collisions are reported more frequently from TCA's than from TRSA's, and more frequently from TRSA's than from other terminal airspace, in proportion to traffic volume in these categories of airspace. Sources of possible bias in these data must be examined.

The ASRS is a voluntary system and its reports are not investigated to verify the reported occurrences. The data reported here are representative only of near midair collisions reported to ASRS, and these data may be biased in a number of respects. Since the definition of a NMAC used in classifying the reports is conservative and the reports are voluntary, the frequencies calculated

from them are almost certainly lower than the true incidence rates, although by what margin cannot be stated.

Reporter bias may be present in the data. A frightening conflict might well cause a reporter to underestimate the minimum distance between aircraft. This would tend to increase the number of conflicts perceived as near midair collisions. On the other hand, reporters tend to "round" their distance estimates to even hundreds or thousands of feet. The miss distance of exactly 500 ft was excluded from the NMAC criterion to minimize the effects of rounding.

More ASRS reports are received from air carrier than from general aviation pilots. Since air carrier operations are a larger proportion of total traffic in TCAs, it is likely that TCA NMAC reports are received more frequently in proportion to traffic volume.

Reporters, during the period of this study, were offered a waiver of disciplinary action for reports of violations submitted to ASRS. Since failure to contact ATC or follow its instructions in TCA's is a violation of Federal Aviation Regulations, whereas it is not necessarily a violation in other terminal airspace, pilots may have been more likely to report conflicts in which they were in the wrong if the conflicts occurred in TCA airspace.

It must also be noted, however, that the ASRS, because it is a confidential third-party reporting system, may contain data less biased by fear of retribution than data in other systems. This is particularly true of reports involving human error and possible violations of Federal Aviation Regulations.

All of these factors may have tended to bias the data shown here. Nonetheless, conflict reports are received by ASRS with sufficient frequency to suggest that a problem exists, though the severity of the problem is not known. It was noted that in the months immediately following the San Diego accident in September 1978, near midair collision reports to ASRS increased by more than 60%. Since there is no reason to believe that the incidence of NMAC's increased during that period, it seems likely that the increase in reports represented a more nearly complete picture of the true situation.

In summary, reporting of near midair collisions may occur more frequently when those encounters occur in TCA or TRSA airspace. There are several factors, however, that may contribute to the incidence of near midair collisions in terminal airspace. These factors relate both to human behavior and system factors.

Discussion

A number of operational and human factors could account for at least part of the differences in reported NMAC rates in the three categories of terminal airspace. One, mentioned under results, is simply traffic density. More airplanes in a confined volume of airspace at a given time increase the likelihood that at least two of them will have an encounter. Working to counter this, air traffic control strategies utilize track and altitude separation and speed control, and in TCA's, prohibitions on nonparticipating traffic. The effectiveness of these measures is presently under study by FAA (ref. 5).

Other factors must be considered in high-density terminal areas. Particularly in high-performance aircraft, within-cockpit workload is high in terminal airspace. Communications workload is

also high, and departure and approach paths require precise flightpath control; all of these tasks require attention within the cockpit and leave less time for external scanning. The following reports discuss some of these factors.

. . . Traffic was not reported by Departure Control . . . flight engineer was occupied with checklists and company radio reports . . . I believe this incident occurred primarily because of our aircraft being required to follow an SID in VFR conditions, requiring me to keep my head in the cockpit too much for safety . . . ”

Approaching XYZ we were given . . . two contacts. We were then switched over to XYZ Tower. Tower identified one contact, but neither of us saw the other one. At this time the cockpit workload became heavy and suddenly B passed in front of us from left to right about 100-200 ft . . . ”

. . . If you have ever tried to go from OAK to SJC through the San Francisco TCA, you are busier than a one-armed paper hanger in a windstorm, trying to change VOR frequencies, to check radials and DMEs, get the ATIS, change approach control frequencies about four times, and try to watch for traffic and fly the airplane at the same time . . .

It is clear that prohibitions against uncontrolled traffic in terminal control areas are not entirely effective. A study by Cunningham of near midair collisions reported to FAA (ref. 6) indicated that half of 78 near midair collisions in TCA's involved one aircraft not known to ATC. Any interpretation of near midair collision data within TCA's must take account of this; intruders in TCA's are a random element in a system designed to provide maximum orderliness in high-density terminal areas. The following example illustrates this problem.

Shortly after turning the SID heading of 340°, we passed directly over the second aircraft. An engine failure after takeoff could have resulted in a collision. The second aircraft was apparently violating the TCA. The tower did not advise of the aircraft and I presume they were not aware of it. The other aircraft appeared to be flying at about 50 ft above the water, presumably in a deliberate attempt to operate unobserved in the TCA . . .

If ASRS reports are representative, many pilots under radar control believe that they will be advised of traffic that represents a potential conflict and behave accordingly. They tend to relax their visual scan for other traffic until warned of its presence; when warned of a conflicting aircraft, they tend to look for it to the exclusion of within-cockpit tasks and scanning for unreported traffic. These examples are typical:

Flight was eastbound . . . slant range visibility was between 2-5 n. mi. . . . when incident occurred. The other aircraft was about 400 ft above . . . I saw him begin a climbing left turn and I began a descending left turn . . . fatigue was definitely a factor as was my dependency on radar since I had just been released by XYZ Departure Control and was somewhat complacent in looking for other traffic.

. . . Approach Control called out traffic one o'clock, 4 miles. . . . I reported no contact as it was hazy. . . . Approach seemed rather concerned that we report the traffic going across twelve o'clock in sight. I did see the traffic at 12:30 high, and as I was no longer concerned

with that one I looked to my left and saw aircraft B at my altitude — at 100 yards. . . . I took evasive action and called Approach on this traffic, which they said they did not see. If Approach Control had not diverted my attention to traffic which was not as important, I would never have gotten so close to aircraft B . . . I do not consider it a safe procedure to have to make four frequency changes within 140 miles of the airport, which requires the pilot to divert his attention from looking around . . . I feel the pilot should be left as free as possible to fly his aircraft and keep a sharp lookout for others.

The air traffic controller cannot inform the pilot of traffic that is not visible on his radar scope, nor can he provide separation from such traffic. It is plain that at least some pilots receiving stage III services believe that they will be told about all traffic that represents a threat, yet controllers can handle traffic only with regard to threats they can see, as in the following situations.

. . . Approach was informed of the (conflicting) aircraft's location and we were told he was not painting this aircraft. Approach did inform aircraft behind us that the small aircraft had been seen at 8,000, but that he still had negative radar contact. This incident points out to me the very serious situation we have allowed to occur. We have concentrated all of our anti-collision avoidance with the radar controller and have left the pilot with only his eyes. All the newest and most sophisticated radar in the world didn't help here because the controller had no radar contact. . . . I would also like to comment (that) civil jet transports require eyes in the cockpit when being flown on arrivals, departures, and approaches. We cannot always be looking out . . .

I noticed aircraft B that had departed runway 19L (I departed 19R) Aircraft B was close so I asked the radar controller about it. The controller was completely without information regarding aircraft B. Fortunately, I saw him in plenty of time to avoid his converging flightpath. Climbing out of 3,500, I had to take evasive action to miss a new aircraft, C. Again, radar had no contact, in any way, with aircraft C. Since both incidents occurred at the same (terminal), I am hopeful some investigation will result in action that will plug a weak spot in the system . . .

One is thus faced with a situation in which pilots may expect more from the ATC system than it can deliver, and in which controllers may be expected to provide more information than their equipment gives them. Whether this problem exists because of misunderstandings, lack of pilot education, or the implied promise of stage III procedures is not fully understood, but the data indicate that it does exist, as the following reports suggest.

. . . Approach called traffic at 3 and 4 miles at ten o'clock. Looking for called traffic (which I never saw) I noticed another aircraft at my altitude, ten o'clock, less than 1/2 mile, closing. I vacated 2,500 for 2,000, turned . . . and told Approach I didn't have the called traffic but did have the guy I just missed . . . Since we were both in TCA, we both should have been under "control" . . . my work for last 8 years has been with ARTS II and III, so I believe in the equipment and not in other humans . . .

. . . We feel that radar should have had aircraft B in contact at the time we took off and we should have been advised of the traffic at or before taking off — the controller must have had B on his scope long before he told us about it . . .

. . . I added full power, pulled back and executed a steep left bank to avoid the other aircraft . . . I advised the controller . . . At no time did the controller advise me of the two aircraft in my area and I am 100% sure the other aircraft did not see me . . .

. . . I made an abrupt evasive descent and aircraft B went overhead within 100 ft. I asked the controller if he had me in radar contact . . . (and) had other traffic in my area; he replied yes. I was in a TRSA and assumed I was getting stage III service . . .

. . . I avoided . . . and informed (Approach) . . . when reestablished (on the approach) I asked why I was not informed of traffic. . . . He replied that he was "too busy to call traffic." I believe that if the haze were any thicker, I would have hit the other plane. . . . This attitude that calling traffic is a secondary function, is preposterous . . . avoiding collision is to me the primary function of an approach controller.

Some general aviation pilots state that they prefer not to utilize stage III procedures in TRSA's. Although the merits of this view are debatable, it is clear that not all of these pilots are simply recalcitrant, as in the following case.

. . . I departed ABC on a VFR flight to DEF. After leaving the traffic pattern, I contacted ABC Departure requesting traffic advisories. I was radar identified . . . and advised of two targets . . . I did not see either aircraft and banked for a better view. Still not seeing them, I rolled back level and immediately saw aircraft B at one o'clock. Before I could react, aircraft B passed directly in front of me As do many pilots in this area, I decline stage III procedures at ABC because of unnecessary, inefficient, and sometimes unsafe altitude and heading restrictions I have been able to practice more effective collision avoidance by listening to communications on the frequency than by receiving advisories I'm afraid many pilots get a false sense of security when under radar control or advisory . . .

Those pilots who do not understand them must be taught the limitations of terminal radar, and of the controllers who use it as their primary source of information. Many aircraft in TRSA's, and some intruders in TCA's, are not transponder-equipped; such aircraft are often not visible to controllers. These aircraft, and many others near TCA boundaries, may represent a threat detectable only by the pilot, and then only if he is looking for them.

The highest level of pilot vigilance must be maintained to avoid midair collisions, regardless of the airspace in which operations are being conducted and regardless of the ATC services being utilized. No pilot should permit himself to be lulled into a false sense of security by ATC procedures that cannot necessarily guarantee separation under visual meteorological conditions.

Air traffic controllers cannot be effective in providing stage III services without good information. Cunningham (ref. 6) indicated that 158 of 268 near midair collisions in TCA's and TRSA's involved at least one aircraft "not known to or in communication with" an ATC facility. There are only two ways, in the present system, that controllers can obtain information about the three-dimensional position of aircraft within their airspace. They can be informed verbally by the pilots of such aircraft, or they can be informed visually by the output of functioning mode-C transponders.

Both FAA and ASRS data make it plain that the lack of such information is a causal factor in a substantial number of near midair collisions in stage III airspace.

Failure to utilize transponders in aircraft equipped with them also derogates safety in stage III airspace, yet ASRS has received several reports like the following, describing near midair collisions in which the nonparticipating aircraft's transponder squawk first became visible to ATC moments after the encounter.

. . . We were 14 miles northwest of Atlanta descending to 5,000 ft. Clear of clouds, hazy, visibility 3-4 miles. Passing through 7,000 ft, aircraft B moved from left to right. We passed directly under him (and) heard the sound of his engine as he passed us . . . ATC reported no traffic in our area. Moments later they reported a target westbound at 7,200 ft. The other aircraft apparently saw us go under him, turned on his transponder and called Approach for radar traffic information . . .

Aircraft A appeared on radar over the outer marker, northbound, primary target. Aircraft B departed on runway 22. Controller called "pop-up" traffic to aircraft B. Pilot of aircraft B sighted traffic at approximately the same altitude. Aircraft B advised it was close and about head-on at the same altitude. It was a single-engine. After both aircraft passed, the unknown traffic turned on his transponder and squawked VFR 1,200, mode C. The unknown traffic never contacted Approach Control . . .

Pilots can take many steps to decrease the likelihood of encounters in and around stage III airspace. An earlier ASRS report on problems associated with TCA and TRSA airspace discussed several of them (ref. 7). The use of strobes and landing lights and the use of transponders will assist both participants and nonparticipants. Avoidance of ILS approach courses at low altitudes is particularly important, as aircrew making an approach are often under heavy workload in the vicinity of the outer marker. Avoidance of the edges of TCA's and TRSA's would substantially reduce near midair collision hazards; these areas have been cited as extremely congested in numerous reports. Uncontrolled VFR corridors through TCA's are usually heavily traveled, of very limited dimensions, and have also been described as the sites of a number of near midair collisions.

. . . No evasive action was required because we had remained VMC and above the glide slope until seeing the traffic . . . it appears the aircraft may have been a departure from Van Nuys . . . attempting a VFR climb through the "sucker hole" that just happened to be at the outer marker . . .

Aircraft was cleared for approach to CLE, ILS23L, to intercept glide slope at or above 4,000 ft. Descent began slightly above glide slope. At Stadium OM, still about 300 ft above glide slope (3,300 MSL) second officer called traffic at one o'clock, slightly low, nearly over Stadium at an estimated altitude of 3,000 ft. . . . Approach Control stated no one was working the traffic . . .

Piloting aircraft A, a helicopter VFR from Van Nuys to Los Alamitos via the VFR corridor over LAX, we were in radar contact and receiving VFR advisories. An aircraft was observed to overtake and pass on the left side of our aircraft within 75 ft. This aircraft was level and at our altitude. Its tail number was ABCDE. It passed and then cut across

our course, descending . . . to the traffic pattern at Torrance. The controller advised that he could not identify this aircraft . . .

With respect to participation in stage III services in TRSA's, the FAA has stated that 80-90% of VFR aircraft avail themselves of such services (ref. 8). Yet, FAA and military data cited by Cunningham indicate that almost two-thirds of near midair collisions in TRSA's involve a non-participating aircraft. Clearly, the risk of a near midair collision is disproportionately high for the aircraft that does not participate in stage III services.

If near midair collisions represent a hazard, as seems obvious, the attack on the problem should have two objectives: to protect the system against such encounters insofar as is possible, but also to make the system as tolerant as possible with respect to unexpected encounters. Graham's study of ASRS data (ref. 5) suggests that there are TCA and TRSA locations where the stage III concept seems to work extremely well, and others where it appears to be less effective. Examination of the differences between these might be most helpful to those who must provide and utilize such services at the new locations where they are being implemented.

We have attempted, in the foregoing discussion, to describe certain behavioral and system factors that appear to be associated with near midair collisions in U.S. terminal airspace. ASRS reports provide a useful source of data for studies of these occurrences; further studies by the ASRS staff will examine the associated factors in more detail.

The system of separation assurance is not "error-proof," nor, in all probability, will it ever be. Separation can be assured most effectively by providing air traffic controllers with the best possible information about all aircraft within their area of responsibility; by minimizing flightcrew workload in terminal airspace, thus permitting them to maintain the best possible outside surveillance; and by making pilots aware of the critical importance of maintaining such surveillance, regardless of the services they are receiving. It is hoped that this study and report will help to increase that level of awareness.

Summary

A study was made of 427 reported near midair collisions in U.S. terminal airspace to elucidate system and human factors associated with such occurrences. It was found that near midair collisions are reported to the NASA Aviation Safety Reporting System more frequently from TCA's than from TRSA's, and more frequently from TRSA's than from other terminal airspace, as a linear function of traffic volume in these categories of airspace. Sources of bias in these findings were examined.

A variety of human and system factors was found to be associated with these near midair collisions. Flightcrew workload, limited visual scan while under radar control, misunderstanding of the limitations of the ATC system, and failure to utilize transponders were observed. A substantial number of reported near midair collisions in stage III terminal airspace involved at least one aircraft not participating in stage III services. For these reasons, pilots must exercise the highest level of vigilance for other traffic, regardless of airspace or radar services being utilized.

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ALERT BULLETINS

Introduction

Alert Bulletins are a form of response by ASRS to problems in the National Aviation System as those problems are perceived by the persons reporting them. In the opinion of ASRS staff members, these alert bulletins deal with problems that constitute a continuing hazard; they require consideration and, when feasible, correction by responsible authority. This report continues the practice of providing a sampling of Alert Bulletins; the bulletins are grouped as they pertain to navigation, airport facilities and maintenance, airport lighting and approach aids, and air traffic control facilities and procedures.

Navigation

1. Text of AB: Hilo, Hawaii, HOA NDB: A reporter points out that the Pahoa NDB at Hilo becomes the only navaid when the VOR is out of service. He cites two recent instances – when the VOR was OTS for maintenance – when the NDB signal could not be read by a military pilot on the ground at Hilo nor from 40 n. mi. out at 4,000 ft by a civilian pilot. The military pilot was able to pick up the NDB signal after takeoff, but lost it again in 2 or 3 minutes. The reporter notes two unsatisfactory condition reports have not effected an improvement in the signal strength of the NDB. He expresses his belief that the lack of reliability of the NDB – particularly in poor weather – creates a potentially hazardous situation.

Text of FAA response: The following actions are being planned to eliminate coverage problems associated with the Pahoa (POA) NDB:

1. Change frequency from 221 kHz to another frequency in the 350 kHz range (to be accomplished in approximately 2 months).

2. Replace existing 50-W TM 3 transmitter with new 400-W solid-state equipment. This is part of an Airway Facilities national program to replace obsolete L/MF equipment. The expected shipping date for this transmitter is September 1979.

* * *

2. Text of AB: Miami, FL, Oceanic Control; Nassau, Bahama Islands, Airway A-17: A pilot reports that the intersections RESIN and AYSON are located on Airway A-17 southeast of Nassau, and that phonetic similarity can, and often does, engender reporting and clearance misunderstandings. Reporter notes that AYSON was changed from the original GRAYSON to meet the five-letter system requirement, and suggests that the existing potential confusion could be eliminated through substitution of GRAYS or GAYSO for AYSON.

Text of FAA Response: AYSON intersection on Bahamas Route A-17 was changed to INDEE through coordination with San Juan area officer. The change was published in the National Flight Data Digest dated March 30, 1979, with an effective date of June 14, 1979.

* * *

3. Text of AB: Miami, FL, Nassau, Bahama Islands: The outer compass locator (KEYES) for the Miami ILS runway 27L transmits on a frequency of 248 kHz with identifier MI(— · ·). The Nassau radio beacon transmits on 251 kHz, identifier ZQA: the identifier is transmitted at a very slow rate, resulting in the first letter, Z (— · ·), sounding to a listener very similar to the KEYES identification. The possibility of confusing the identifiers, coupled with the small frequency separation between the two transmitters (within the calibration tolerance of most ADF receiver dials) and the greater power of the Nassau signal, presents a strong risk that a pilot eastbound toward Miami could utilize the incorrect homing signal and thus continue flight beyond Miami and over water. Air carrier pilot reporter recommends a change of one of the two frequencies to eliminate the potential hazard cited.

Text of FAA response: We have reviewed the subject alert bulletin and have decided that a frequency change to the Miami outer compass locator (KEYES) would eliminate the potential hazard described. The necessary action will be initiated to effect such frequency change.

* * *

4. Text of AB: Jacksonville, NC, HAH Non-Directional Radio Beacon: A pilot reports that HAH Non-Directional Radio Beacon, intended to define a segment of Atlantic Route 7, transmits on a frequency of 198 kHz, which is below the 200 kHz lower limit assigned for aeronautical frequencies. Because of this, certain new types of radio direction-finding equipment with digital control markings commencing at 200 kHz cannot receive the beacon. Reporter states that inability to utilize HAH forces pilot reliance on radar vectors for navigation.

Text of FAA Response: The high power for this radio beacon was required for over-water flight between New York and Miami. No frequency in the 200-415 kHz band was available. Numerous lower power facilities would have had to give way (changed or eliminated) to make room for this high-powered station. Since November 22, 1977, the lower limit for aeronautical radio beacons has been 190 kHz. The present assignment may be an inconvenience to some users but is not considered unsafe nor contributing to an unsafe condition.

Airports: Facilities and Maintenance

5. Text of AB: Little Rock, AR, Adams Field Airport: Two recent reports describe an aircraft on taxiway "F" crossing the end of runway 32 when runway 14 was active. While the crossing aircraft did not contact Ground Control, both reporters suggest that there is a need for appropriate markings on taxiway "F" to indicate to pilots that taxiway "F" crosses the end of runway 32/14 and to give pilots a visible hold-short point when runway 32/14 is active.

Text of FAA Response: Aviation Safety Report AB 79:3 has been discussed among the Arkansas Division of Aeronautics, the Adams Field Airport Management, and the FAA, including Airports, Flight Standards, and Air Traffic personnel. The crux of the problem is allegedly insufficient markings on taxiway F; however, hold lines and runway intersection signs conforming with current standards were installed during a recent ADAP project. Although no details of the incidents are known, their infrequency suggests that the problems were a matter of inattention rather than a system deficiency.

No amount of reconfiguration or installation of new guidance facilities will provide an efficient yet fail-safe system. All airport users have a responsibility to operate safely on the field. In our opinion, this intersection conforms to standards, and no corrective action is required.

* * *

6. Text of AB: St. Louis, MO, Lambert International Airport, Taxiway "F," Runway 13/31: A report notes that taxiway "F" at this facility has runway markings designating it as runway 13/31, but is used only as a taxiway and is shown on the Jeppesen airport charts as a taxiway. The reporter contends that pilots of aircraft, when cleared to land on runway 12L/30R, frequently align themselves with taxiway "F" (runway 13/31) because it is adjacent and parallel to runway 12L/30R and has runway markings. The report references a recent incident of an aircraft taxiing on "F" while another aircraft cleared for landing on runway 12L approached taxiway "F" (runway 13) and was so low when noticed and diverted by the tower controller that a near miss with the taxiing aircraft occurred. The reporter suggests the removal of the runway 13/31 designators to avoid further incidents.

Text of FAA Response: Airport manager was contacted; he advised that the markings had been removed. In addition, the taxiway will be overlaid and extended this summer.

* * *

7. Text of AB: San Francisco, CA, San Francisco International Airport: Reports indicate that wide-body aircraft holding between runways 28L and 28R can constitute an obstructing hazard for aircraft landing on 28L. One reporter, while acknowledging that the hazard may be more psychological than real, contends that the effect is the same on a pilot's decision to maneuver to avoid the apparent hazard or to execute a go-around. In addition, one report notes that jet exhaust directed across the runway could cause dangerous or distracting turbulence.

Text of FAA Response: The situation described by the reporter does not constitute a safety hazard based on current taxiway holding-line criteria. Specifically, runways 28L (10,600 ft x 200 ft) and 28R (11,870 ft x 200 ft) centerlines are separated by a distance of 750 ft. Allowing the required 150 ft for each taxiway holding line at either end of the adjoining taxiway, 250 ft remain to accommodate heavy jet aircraft holding short of 28R. Considering the following aircraft lengths, there is sufficient space to contain heavy jet aircraft: DC-10, 182 ft; L-1011, 177 ft; B-747, 232 ft (longest version).

Although the problem may be more psychological than real, particularly regarding jet exhaust turbulence, it nonetheless merits consideration. This is especially true in view of the present FAA effort promoting the maintenance of an obstacle-clear area (runway safety zone) 300 ft either side of all precision instrument runway centerlines for runway holding-line marking purposes.

In support of the aforementioned effort, the FAA is now considering revising the distance standard for taxiway holding lines from precision instrument runways and improving holding-line visibility (e.g., signs and markings). A decision is expected in the very near future.

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8. Text of AB: Tucson, AZ, Tucson International Airport: A report from a controller notes the recent establishment of several fixed-base operations in the area beyond the approach end of runway 21, which has a displaced threshold of 500 ft; present taxiways join the runway at the displacement point rather than at the actual end. The new FBO area is inaccessible to taxiing aircraft from other parts of the airport except via the initial 500 ft of the runway and a roadway/taxiway from the runway end. Reporter contends that this condition is inefficient and could be hazardous by adding to controller workload, causing delays to other aircraft, and, on occasion, leading to unauthorized runway incursions by pilots unfamiliar with the area. He recommends that the construction be expedited of new taxiways connecting the FBO area with the end of runway 21 and with existing taxiway "C".

Text of Response from Airport Authority: The extension of taxiway "C" to the approach end of runway 21, which will serve the referenced new FBO area, has been designed and will go to bid on April 15, 1979 with construction anticipated to be completed by December 1979.

If I can provide you with any additional information, please feel free to contact me.

Text of FAA Response: A new taxiway was constructed to the end of runway 21 from the Fixed-Base Operations area north of the runway under ADAP-09. Construction started September 25, 1978, and is complete. The final inspection is scheduled for April 16, 1979. Construction was delayed due to abnormal weather conditions.

Taxiway C is being extended to the end of runway 21 on the south side under ADAP-11. Bids opened April 5, 1979, with Notice to Proceed estimated for May 28, 1979. Construction period is 180 days. Estimated acceptance date is November 23, 1979. Existing taxiways in the area will connect to this extension.

It should be noted that we coordinate all development under ADAP in accordance with standard regional procedures and that the ATCT at Tucson was informed of the above development in accordance with those procedures.

Airports: Lighting and Approach Aids

9. Text of AB: Orlando, FL, Orlando International Airport: A recent report indicates that although the VASI on runway 18L at MCO is reported as commissioned and noted as being available on the approach charts, it is not being turned on by the tower controllers. On one occasion when queried by the reporter as to the reason the VASI was not available, the controllers contended that they had been instructed not to use the VASI system.

The reporter is not aware of any NOTAMS on the runway 18L VASI at MCO and feels this VASI is a much needed landing aid on 18L to prevent a possible landing short of the runway.

Text of FAA Response: The VASI on runway 18L at Orlando International Airport (MCO) was out of service for most of the month of January 1979 due to a part failure for which there was no replacement part available. The controllers were in fact told not to attempt to turn the 18L VASI system on due to the possibility of further damage to the system.

An out-of-service VASI meets NOTAM criteria "L" which means local dissemination only; thus, although this outage was reported, that information was not disseminated beyond the local level.

The system is presently operational.

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10. Text of AB: Fresno, CA, Fresno Air Terminal: A recent ASRS report states that at Fresno Air Terminal an unlighted air carrier aircraft is customarily parked overnight in a ramp position that hinders the movement of arriving aircraft attempting to taxi to their own gates via a high-speed turnoff. Lack of illumination in the area prevents flightcrews from observing the parked aircraft in sufficient time to avoid the necessity of executing 180° turns to return to the taxiway and follow a different route to the terminal. Reporter feels that, in addition to the inconvenience caused by this practice, the unlighted parked aircraft represents a hazardous obstruction to movement on the airport and recommends that floodlighting be provided in the affected area.

Text of response from Airport Operations Supervisor: Letter from Fresno Airports Operations Supervisor to Airline Station Manager: A number of reports have been received recently by this office, concerning your company's turbojet parked unlighted at gate No. 9 (north end of the Concourse), during nighttime. Lack of illumination in the area prevents flightcrews of other aircraft exiting from runway 29R/11L from observing the unlighted RON aircraft in sufficient time to avoid the necessity of executing 180° turns to follow a different route to the terminal, when they attempt to taxi to their own gate, via the high-speed taxiways.

In addition to the inconvenience caused by this situation, it is felt that the unlighted aircraft (RON at gate No. 9) represents a hazardous obstruction to movement on the ramp at night.

In light of the above, it is requested that the use of parking gate No. 9 to park RON aircraft be discontinued immediately, unless the aircraft is either internally lighted or provided with obstruction lights surrounding it, or otherwise rendered visible at night.

(Please note that, intentionally, floodlighting is not provided north of the Concourse, in order not to create a "blinding effect" on pilots landing on or taking off from 11R/29L.)

Your cooperation is much appreciated in disseminating the above information to all concerned airline personnel. Meanwhile, should you need further clarification regarding the above, please feel free to contact me.

ATC: Facilities and Procedures

11. Text of AB: The five letter fix designator TOUTU on the SDF approach to runway 27, Elkhart Muni Airport (EKM), Elkhart, IN has a phonetic sound which is essentially the same as the number TWO TWO. Location, altitude, and distance confusion results between pilots and controllers during radio usage. Name change recommended by reporter.

Text of FAA Response: Effective 8/10/78 the present TOUTU intersection will be changed to POLER. Coordination has been accomplished with the charting agency (NOS) and South Bend Approach Control.

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12. Text of AB: Wheeling, IL, Palwaukee Airport: The lack of physical security measures, particularly fencing, to prevent nonaviation vehicular and pedestrian activity on and near aircraft operational areas is reported to be creating a safety hazard at this facility. In one recent instance, a light turbojet aircraft landing on runway 34 encountered several children on bicycles during the aircraft's roll-out; a reporter noted that the encounter could have been much more serious except for the fact that the turbojet's pilot was forewarned of the children by another pilot who happened to see the bicycle activity and heard the turbojet's landing clearance.

The issue of Palwaukee's minimal physical security measures was the subject of a NASA ASRS message to the FAA in May of 1976 (see TCR 007, item 3). The FAA response (dated June 8, 1976) to that message reads in part:

Palwaukee is a privately owned airport and is not eligible for federal funds. The Illinois Department of Transportation has determined that it would not be in the public interest to recommend closing the airport based on the facts at hand. They also recommend that the tower chief, and other assigned personnel, should continue to work closely with the airport owner to assure that all possible measures have been taken to protect the aircraft movement areas from unauthorized use by people and vehicles. FAA concurs with the State."

Recent ASRS reports indicate that the situation reported in May 1976, continues to exist and allege that serious conflict situations occur daily.

Text of FAA Response: The situation at Palwaukee is as previously stated. However, the region is attempting to get the airport owner and the tower people together to work out any difficulties as they develop.

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13. Text of AB: Parkersburg, WV, Wood County Airport: A pilot reports that aircraft radio reception from the Parkersburg ATCT is frequently lost or garbled due to interference from aircraft transmissions to Standiford Approach Control (Louisville, KY); only aircraft in flight in the vicinity of SDF create the radio interference, SDF Approach Control's transmissions are not an interference factor. The reporter notes that "it is very frustrating to hear aircraft reporting at an altitude that you're presently occupying and wondering if he's at PKB or SDF."

Text of FAA Response: Parkersburg ATCT advised that during the summer of 1978, several complaints of this interference were received. Since that time, there has been no problem. Both assignments are very old (in excess of 10 years). It is not known if the problem was the result of unusual propagation conditions or temporary procedure changes at Louisville. We do not plan to make any frequency changes at this time.

Ames Research Center

National Aeronautics and Space Administration

Moffett Field, California 94035, August 1, 1980

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16. Abstract <p>This eleventh quarterly report of ASRS operations contains a comprehensive study of near midair collisions in terminal airspace, derived from the ASRS database. This study was scheduled originally for publication in an earlier quarterly report; because of its significance to the aviation community, its publication was deferred to allow time for review and comment by various segments of the community. This report also includes a selection of controller and pilot reports on airport perimeter security, unauthorized takeoffs and landings, and on winter operations. A sampling of typical Alert Bulletins and their responses appears as the final section of the report.</p>			
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